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विद्युतीय मशीनों के बुरुश धारकों की परिभाषाएं और परिभाषिक शब्दावली

Indian Standard

DEFINITIONS AND TERMINOLOGY OF BRUSH HOLDERS FOR ELECTRICAL MACHINES

UDC 621 : 313·047·5 : 001·4

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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Price Group 7

Rotating Machinery Sectional Committee, ET 15

NATIONAL FOREWORD

This Indian Standard which is identical with IEC Pub 560 (1977), issued by the International Electrotechnical Commission, was adopted by the Bureau of Indian Standards on the recommendation of the Rotating Machinery Sectional Committee (ET 15) and approval of the Electrotechnical Division Council.

The text of IEC Standard has been approved as suitable for publication as Indian Standard without deviations.

Only the English language text given in the International Standard has been retained while adopting it as Indian Standard, and as such the page numbers given here are not the same as in IEC Publication.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the results of a test, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

CROSS REFERENCES

In the IEC Standard, for definitions and nomenclature for carbon brushes, brush holders, commutators and slip-rings; and also for contact bevel angle α, IEC Publication 276 has been referred to. In this Indian Standard read in its place IS 13586 : 1993 which is technically equivalent to IEC Publication referred.

Indian Standard

DEFINITIONS AND TERMINOLOGY OF BRUSH HOLDERS FOR ELECTRICAL MACHINES

1. Scope

This standard applies to brush-holders for electrical machines.

2. Object

To establish a common vocabulary of terms and definitions for determining the functions and characteristics of brush-holders.

3. Preliminary definition

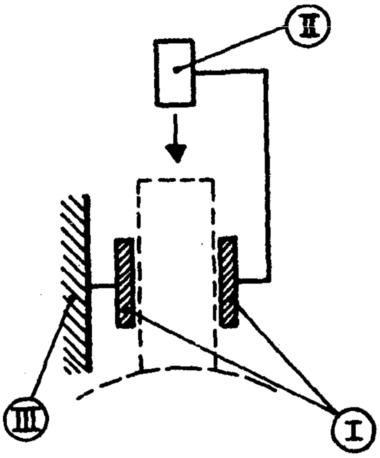
3.1 A brush-holder is a component of a rotating electrical machine, its purpose being to:

Maintain a brush or several brushes in a definite position relative to the current collector and to apply a given force on this brush or these brushes.

3.2 A brush-holder normally comprises:

- I. A box to receive the brush or brushes
- II. A pressure system
- III. A method of fixing

The schematic representation of the brush-holder is recommended in accordance with the following diagram.

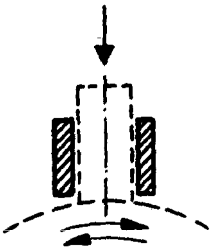
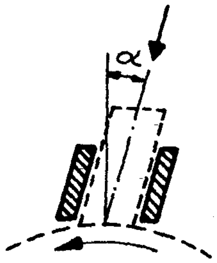


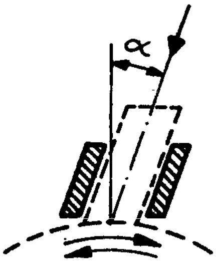
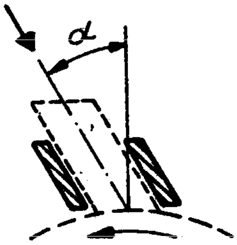
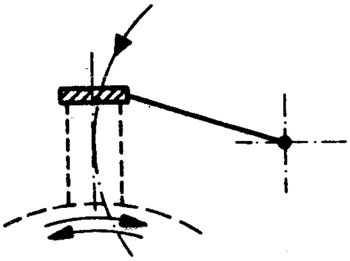
CHAPTER I

4. Arrangement of brushes

4.1 *Presentation on the commutator or slip-ring*

The brush-holder is defined primarily by the method of presentation of the brush to the commutator or slip-ring.

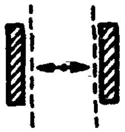
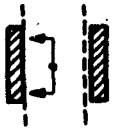
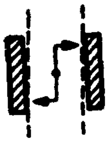
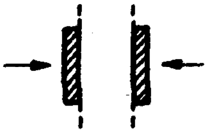
4.1.1	*RADIAL*	
4.1.2	*INCLINED with the direction of rotation* (trailing) at an angle α	

4.1.3	*INCLINED for both directions of rotation* at an angle α	
4.1.4	*INCLINED against the direction of rotation* (reaction) at an angle α	
4.1.5	*VARIABLE* (as in leg type brush-holders)	

Note. — For all inclined brush-holders, it is necessary to indicate a value for contact bevel angle α.

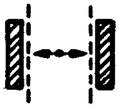
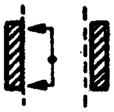
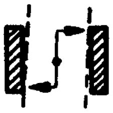
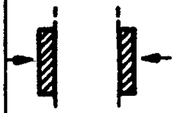
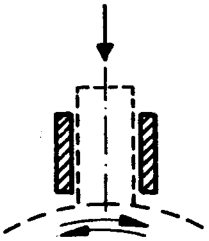
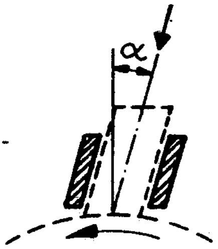
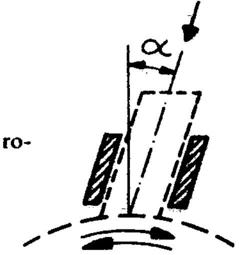
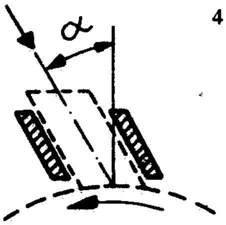
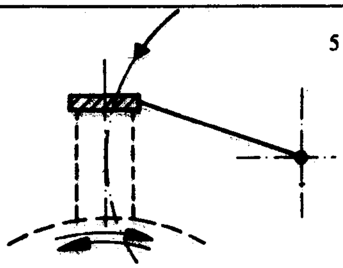
4.2 *Position in the box*

The method of presenting the brush to the commutator or slip-ring can influence the position of the brush in the box.

4.2.1	*Free* The position of the brush in the box is not controlled.	
4.2.2	*Face location* The brush is maintained against one face of the box by the effects of the components of force which do not produce a turning moment.	
4.2.3	*Diagonal location* The brush is maintained in contact with the bottom edge of one face and the top edge of the opposite face of the box by the effects of the components of force which produce a turning moment.	
4.2.4	*Fixed* By means of a clamping device, the brush is held solidly in the box (as in a leg type brush-holder).	

The association of the methods of *presenting* the brush to the commutator or slip-ring and the *position* of the brush in the box determines the combinations shown in the following table.

TABLE I

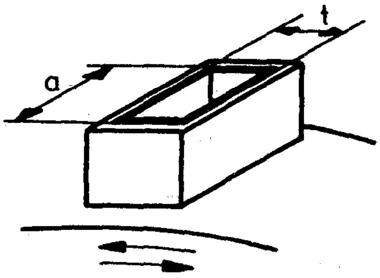
Presentation of the brush to the commutator or slip ring	Position of the brush in the box			
	1	2	3	4
	Free 	Face location 	Diagonal location 	Fixed 
RADIAL  1	1.1	1.2	1.3	
INCLINED with the direction of rotation (trailing)  2		2.2	2.3	
INCLINED for both directions of rotation  3		3.2	3.3	
INCLINED against the direction of rotation (reaction)  4		4.2		
VARIABLE  5				5.4

CHAPTER II

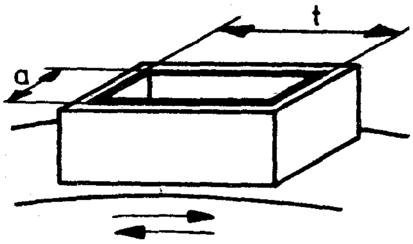
5. Arrangement of boxes

5.1 *General*

The brush-holders, according to the arrangements of the box(es), are divided into two groups symbolized by the letters A and T.



5.1.1 *Symbol A:* $t<a$



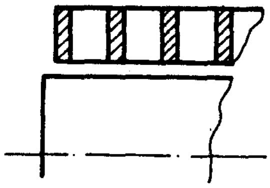
5.1.2 *Symbol T:* $t>a$

5.2 *Multiple boxes*

5.2.1 Axial direction

A brush-holder is described as 2-box, 3-box, 4-box, etc., when the boxes are placed side by side either with or without circumferential stagger.

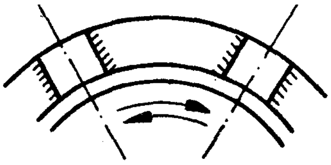
The boxes can be single or tandem, radial or inclined (see Table II).



5.2.2 Tangential direction

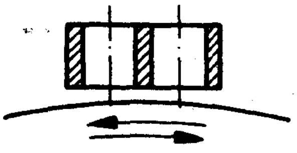
A brush-holder is described as double (2T), triple (3T), etc., when 2 boxes, 3 boxes, etc., are placed one in front of the other either with or without axial stagger.

The boxes can be single or tandem, radial or inclined or variable (see Table II).

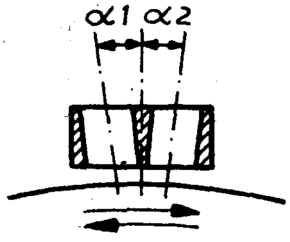


5.3 *Tandem boxes*

5.3.1 A box is described as "tandem" when it is divided in a tangential direction by an axial wall providing two separate parallel half-boxes.



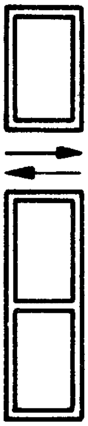
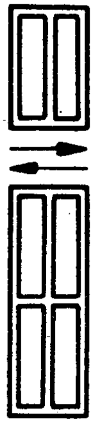
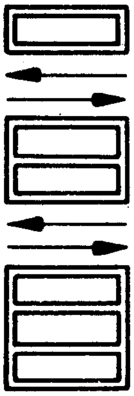
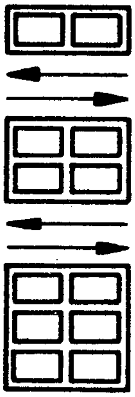
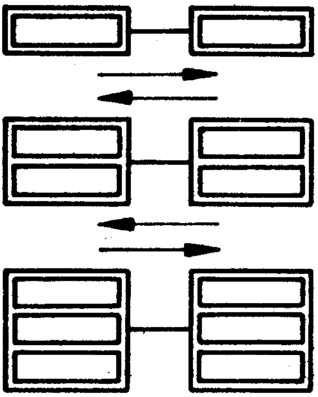
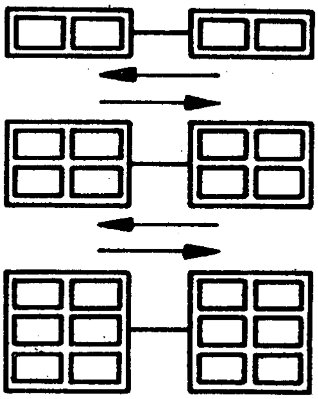
5.3.2 A box is called "V tandem" if the dividing wall is trapezoidal and the two half-boxes radial or inclined and it is necessary to indicate a value for angles $\alpha 1$ and $\alpha 2$.



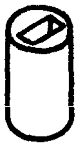
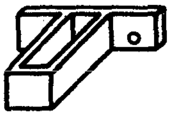
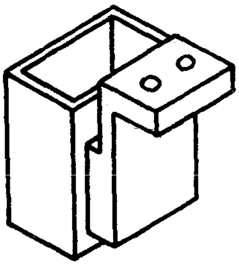
5.4 *Combination of boxes*

The table below indicates possible combinations of boxes in the brush-holders. The table is not comprehensive.

TABLE II

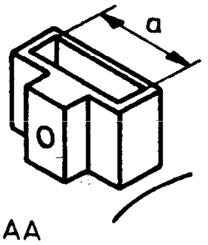
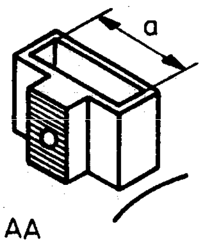
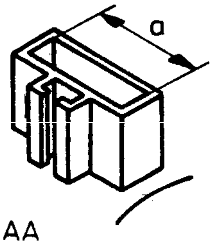
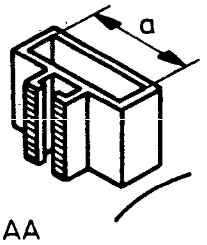
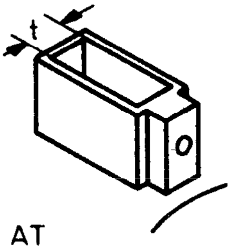
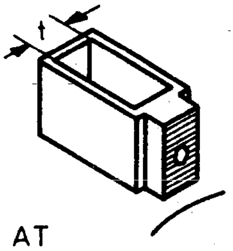
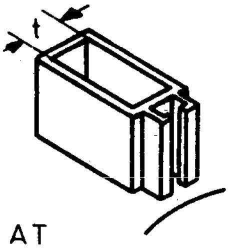
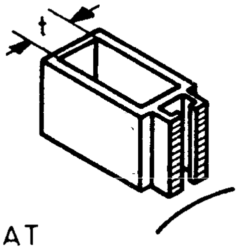
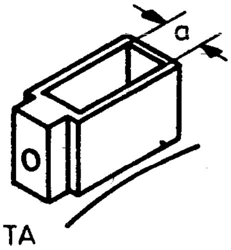
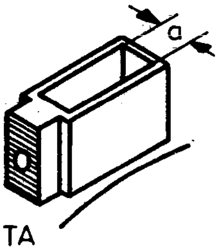
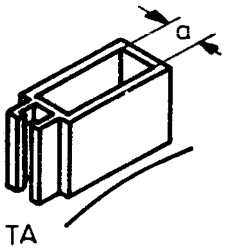
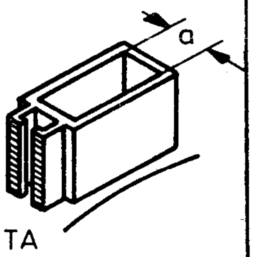
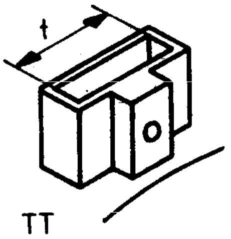
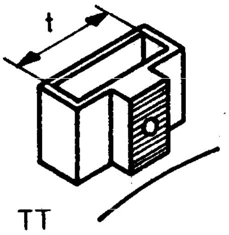
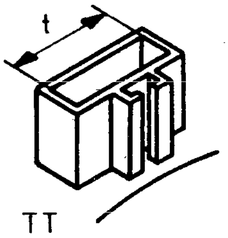
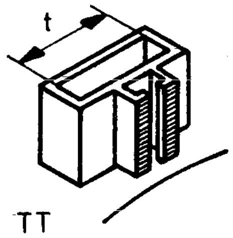
		Brush-holders with single boxes	Brush-holders with tandem boxes
A	1 Box 2 Boxes etc.		
T	1 Box 2 Boxes 3 Boxes etc.		
2T	2 × 1 Box 2 × 2 Boxes 2 × 3 Boxes etc.		
3T	etc.		

CHAPTER III

6.	**Fixing arrangements**	
6.1	*Circular fixing*	
6.2	*Flange fixing*	
6.3	*Face fixing*	See Table III
6.4		
6.5	*Spindle mounting*	See Table IV

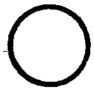
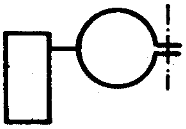
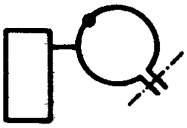
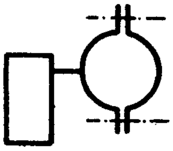
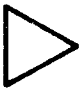
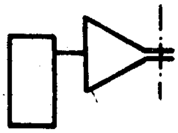
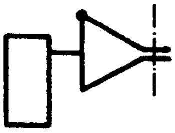
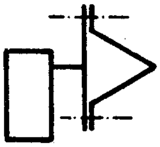
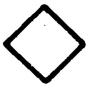
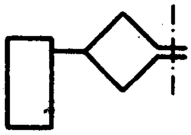
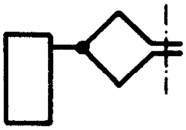
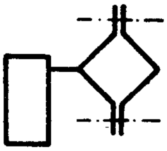
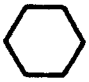
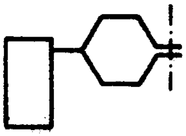
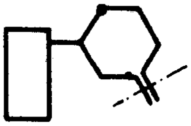
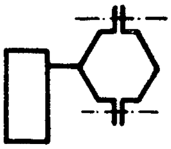
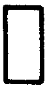
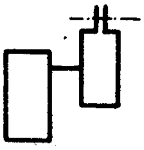
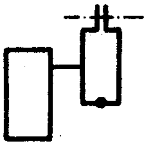
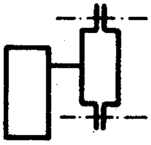
Note. — The face-fixing element may be asymmetrically disposed with relation to the box.

TABLE III

	Fixed		Adjustable	
	Plane face	Serrated face	Plane face	Serrated face
A Fixing parallel to the axial direction	 AA	 AA	 AA	 AA
Fixing parallel to the tangential direction	 AT	 AT	 AT	 AT
T Fixing parallel to the axial direction	 TA	 TA	 TA	 TA
Fixing parallel to the tangential direction	 TT	 TT	 TT	 TT

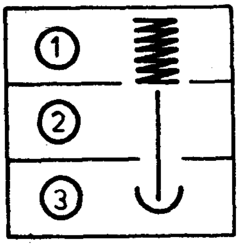
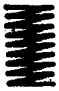
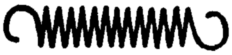
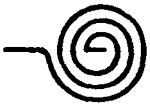
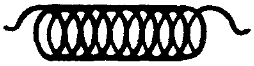
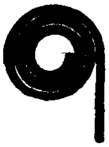
Note. — The face-fixing element may be asymmetrically disposed with relation to the box.

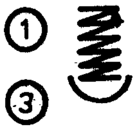
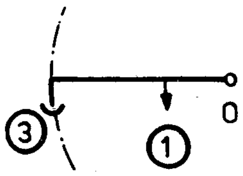
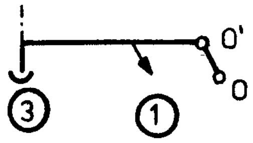
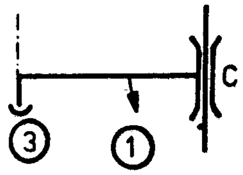
TABLE IV

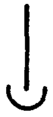
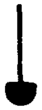
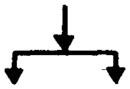
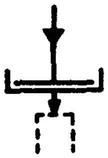
Shape of clamp		Method of clamping		
		One-piece clamp	Hinged clamp	Two-piece clamp.
Round				
Triangular				
Square				
Hexagonal				
Rectangular				

Note. — The exact orientation of clamps is not necessarily the one shown.

CHAPTER IV

7.	**Pressure systems** A pressure system may comprise: 1. An actuating device 2. A transmission device 3. An application device 4. An insulating device (see Sub-clause 7.4)	
7.1	*Actuating devices* ①	
7.1.1	Compression spring	
7.1.2	Extension spring	
7.1.3	Spiral (clock) spring	
7.1.4	Torsion spring	
7.1.5	Self-recoiling (constant force) spring	
7.1.6	Other devices	

7.2	*Transmission devices* ② Intermediate mechanism for transmitting the force of the actuating device ① to an application device ③	
7.2.1	Direct transmission The actuating device ① acts directly on the application device ③ or on the brush.	
7.2.2	Simple finger Pivoted at O	
7.2.3	Articulated finger Pivoted at O, articulated at O′	
7.2.4	Carriage device Slides on C	

7.3	*Application device* ③ *on the brush* The application device is that element of the pressure system which is in direct contact with the brush.	
7.3.1	Plain pressure pad Transmits the force on to the brush.	
7.3.2	Conducting pad In addition, conducts the current from the brush.	
7.3.3	Pressure pad with equalizer The force of the pressure system is divided into two equal parts and acts on two brushes.	
7.3.4	Damping device A damping device may be arranged to absorb the vibrations transmitted to or by the brush. *Notes.* — The damping device may be placed on the top of the brush. — The 4 types of application devices may be used separately or in association with one another.	

7.4 *Insulation*

7.4.1 Insulation may be arranged to prevent the passage of current through the pressure device or other parts of the pressure system.

7.4.2 The insulation may be in any position in the pressure system.

Note. — Insulation may also be placed at other positions, such as on the top of the brush.

In the description of a brush-holder, it is necessary to indicate the number of pressure systems.

CHAPTER V

8. Characteristics of construction

In the description of a brush-holder, it is necessary to indicate the materials and the nature of its construction (table, page 23).

e.g. — riveted sheet brass
— cast bronze
— injection moulded polyamide
— etc.

Note. — The 7 characteristics of construction can be used separately or in association with one another.

8.1	*Riveted sheet metal*
8.2	*Welded or brazed sheet metal*
8.3	*Folded sheet metal*
8.4	*Extruded metal*
8.5	*Metal forging or stamping*
8.6	*Cast metal*
8.7	*Other methods* (to be defined) e.g. powder metallurgy (sintering) or moulded plastics, etc.

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